

Analyzing Pitch Content in Traditional Ghanaian *Seperewa* Songs

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Introduction and Motivation

Examines archived recordings of *seperewa*, a Ghanaian harp-lute that accompanies sung repertoire in Akan languages

Proposes methodology for pitch analysis of non equal-tempered music from indigenous cultures

Research Questions

Can we use MIR to retrieve an already known scale from the pitch content of a *seperewa* song?

How “equal tempered” are the scales we approximate? how microtonally flat or sharp are the scale degrees?

How similar are a song’s *seperewa* and vocal scales?

Activating an Archival Ghanaian Music Dataset

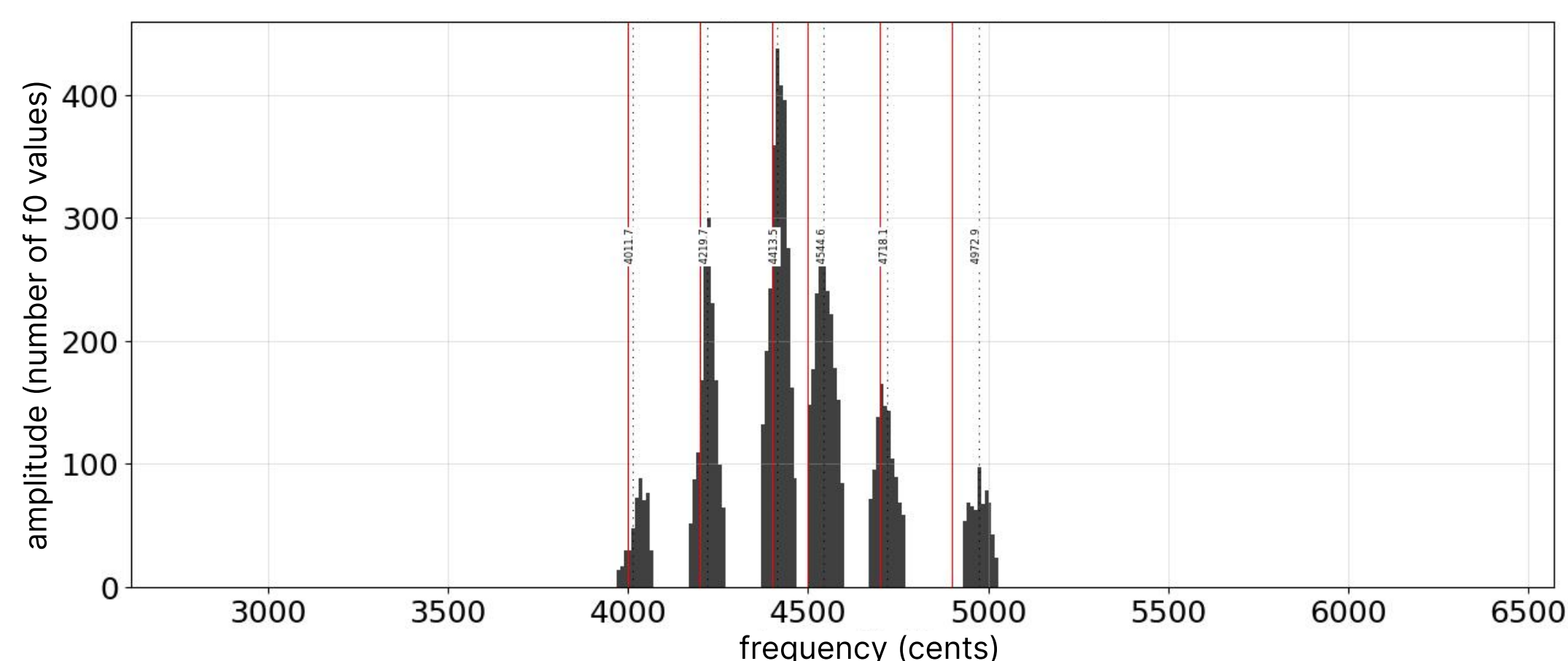
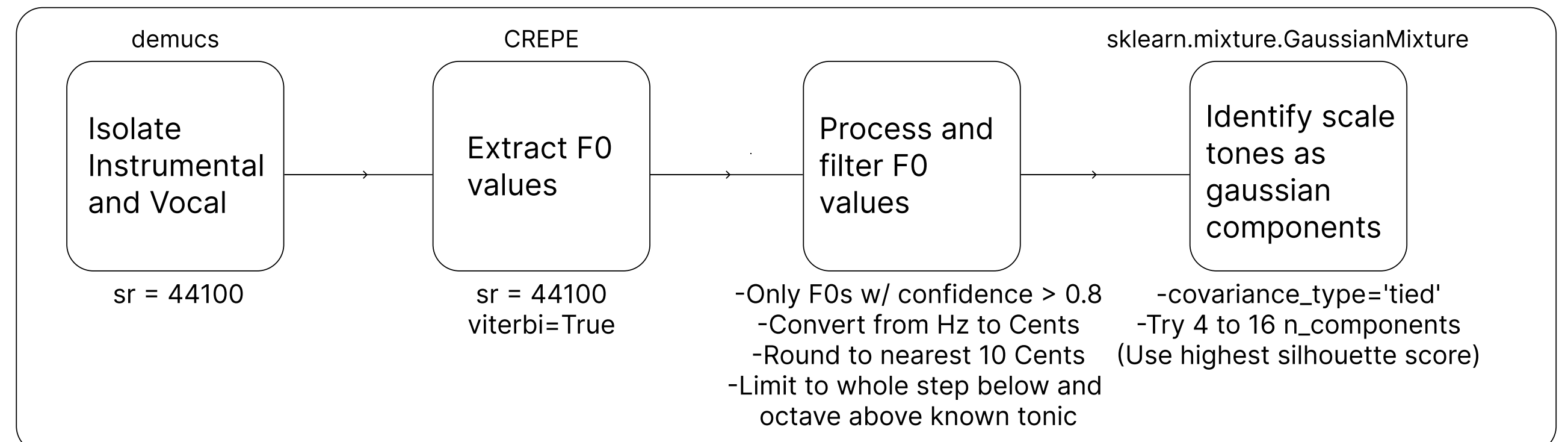
71 songs from field recordings during the early 1960s in what was then the United Kingdom’s Gold Coast Colony

Earliest known recordings of this endangered music tradition

Opportunity to examine pitch content in music with pre-colonial origins

Method

Scale Approximation Pipeline (SAP)



Component amplitudes for a song’s *seperewa* F0 values. Red lines indicate the known, equal-tempered approximation of the *seperewa* scale.

Results

Given a known *seperewa* tuning, which scale components did our scale approximation pipeline (SAP) find?

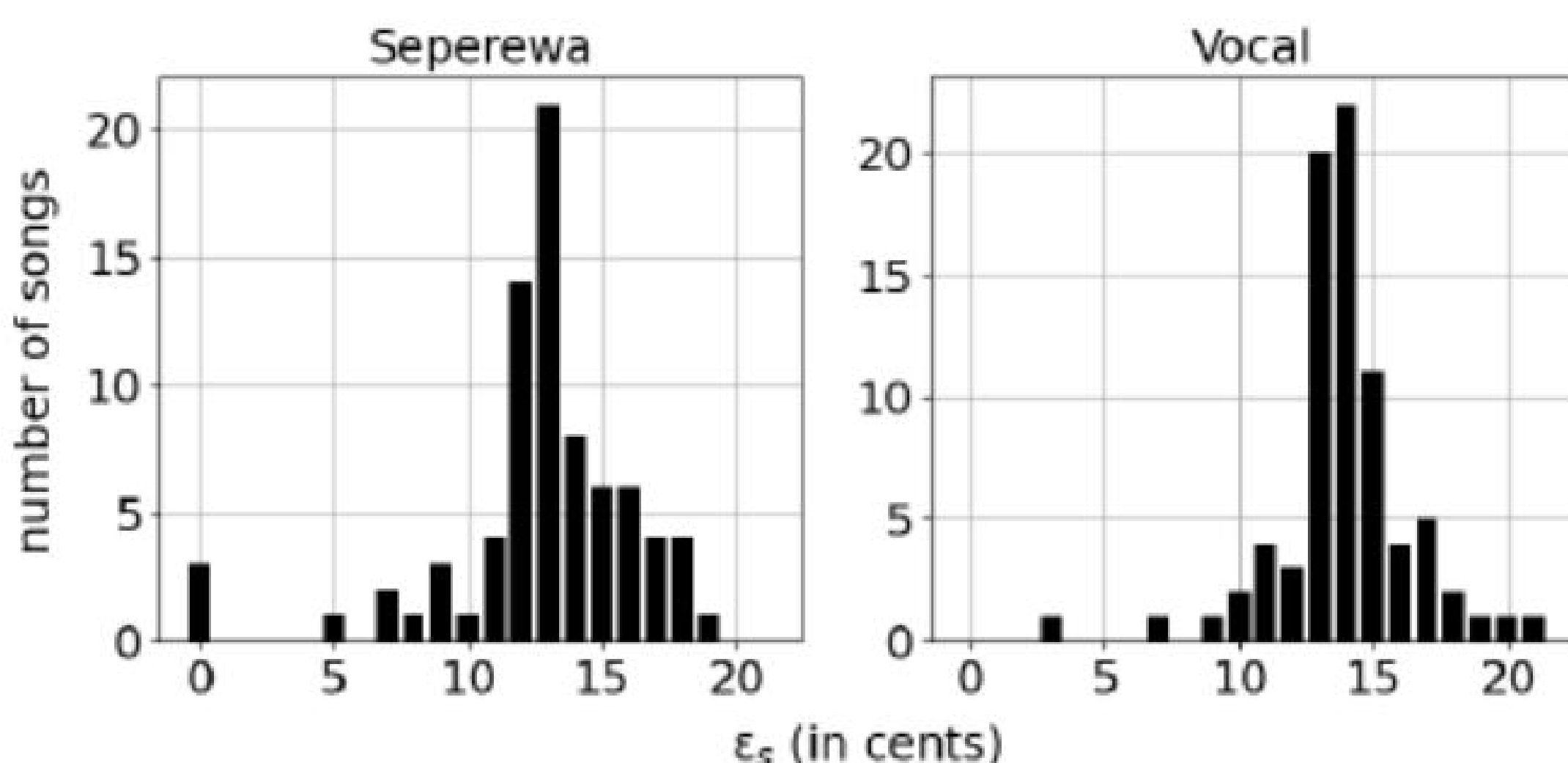
Scale Degree	Quality	No. of songs where in <i>seperewa</i> tuning	Seperewa			Vocals		
			Retrieved	Missing	Unexpected	Retrieved	Missing	Unexpected
Tonic		71	50	21	0	65	6	0
2nd	Minor	—	—	—	19	—	—	14
	Major	71	39	32	0	49	22	0
3rd	Minor	3	2	1	17	1	2	26
	Major	68	39	29	1	44	24	2
4th		71	47	24	0	55	16	0
Tritone		—	—	—	12	—	—	11
5th		71	58	13	0	61	10	0
6th	Minor	3	2	1	6	2	1	8
	Major	68	42	26	1	45	23	1
7th	Minor	—	—	—	25	—	—	25
	Major	—	—	—	44	—	—	42
Avg. (std.)		53.25 (± 29.04)	34.88 (± 19.86)	18.38 (± 11.34)	10.42 (± 13.2)	40.25 (± 23.39)	13.0 (± 8.9)	10.75 (± 13.12)

A scale degree is considered successfully retrieved if our pipeline returns a component within 50 cents of its known, equal-tempered approximation

How flat or sharp is each sung scale degree compared to the *seperewa* scale?

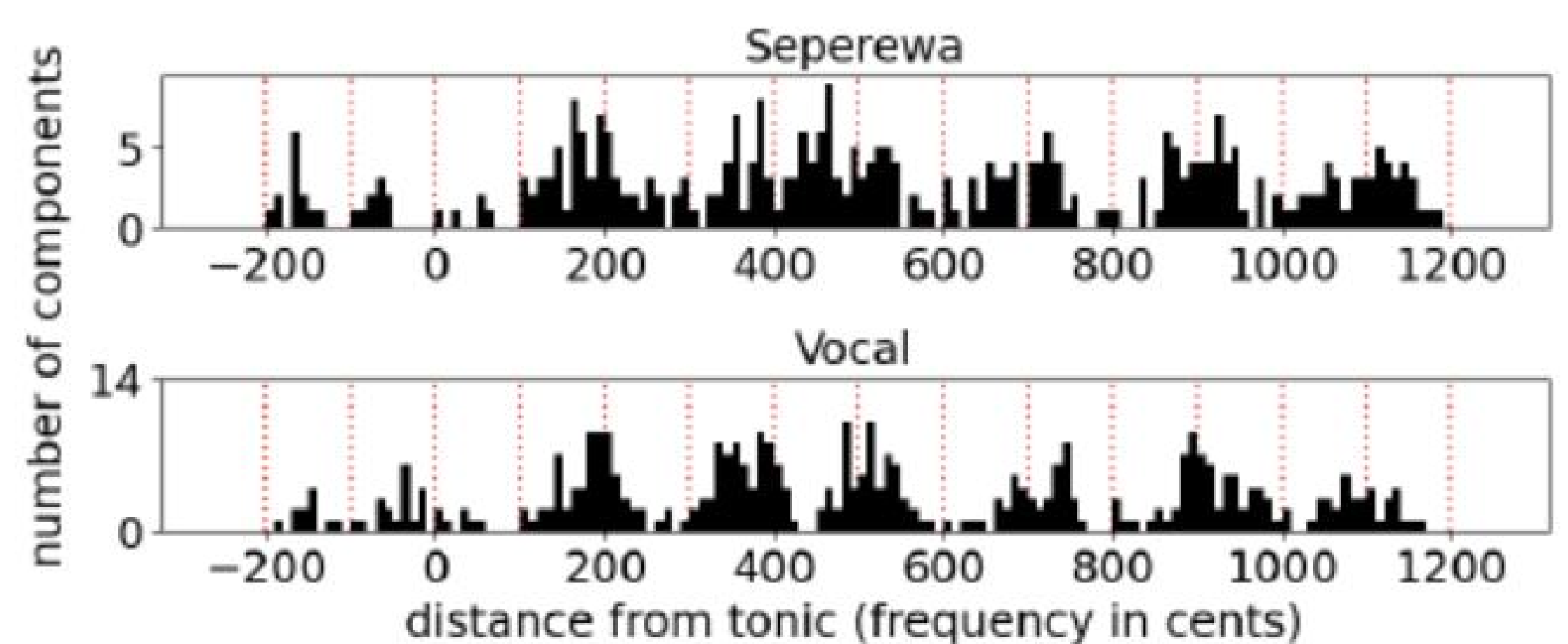
Scale Degree	Quality	No. of songs with comp. in both	Avg. Distance (± std.)
Tonic		50	-2.03 (± 36.8)
2nd	Minor	7	2.01 (± 15.21)
	Major	30	-1.08 (± 36.92)
3rd	Minor	12	2.2 (± 24.58)
	Major	26	-12.57 (± 42.13)
4th		37	21.42 (± 38.65)
Tritone		4	8.67 (± 30.01)
5th		53	0.67 (± 32.32)
6th	Minor	4	17.92 (± 32.0)
	Major	28	7.08 (± 29.11)
7th	Minor	11	-11.12 (± 45.41)
	Major	24	-21.45 (± 43.59)

How equal-tempered are the scales of songs?



An ϵ_s at or close to zero would correspond to an equal-tempered scale.

How microtonally flat or sharp are individual scale degrees in our corpus?



The vertical red lines correspond to a twelve-tone equal-tempered scale.

Conclusion

Explores microtonal variance and tendencies outside the Western equal-tempered tuning system.

Underscores the necessity of adopting decolonizing methodologies in musicology

Future work will expand our methodology to analyze sequential pitch content, like melodic and harmonic structures

Listen to brief snippets of select songs here



Citations

K. Agawu, “Tonality as a colonizing force in africa,” *Audible empire: Music, global politics, critique*, pp. 334–56, 2016

J. K. Nketia, “Generative processes in *seperewa* music,” *To the Four Corners: A Festschrift in Honor of Rose Brandel*, vol. 14, no. 1994, p. 117, 1994.

I. R. Roman, D. Faronbi, I. Burger-Weiser, and L. Adu-Gilmore, “F0 analysis of ghanaiian pop singing reveals progressive alignment with equal temperament over the past three decades: A case study,” in *20th Sound and Music Computing Conference, SMC 2023*. Sound and Music Computing network, 2023, pp. 27–33.